SCAN OPTICS

SO-5800 MICROSCOPE

USER MANUAL

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INTRODUCTION

Please read the following information carefully before using the Scan Optics SO-5800 ophthalmic microscope. Scan Optics is responsible for the safety, reliability and performance of the equipment only if it is used in accordance with these instructions.

This microscope is designed for use by a certified practitioner, for magnified observation of patients, and for use in an operating theatre as an observation aid during surgery.

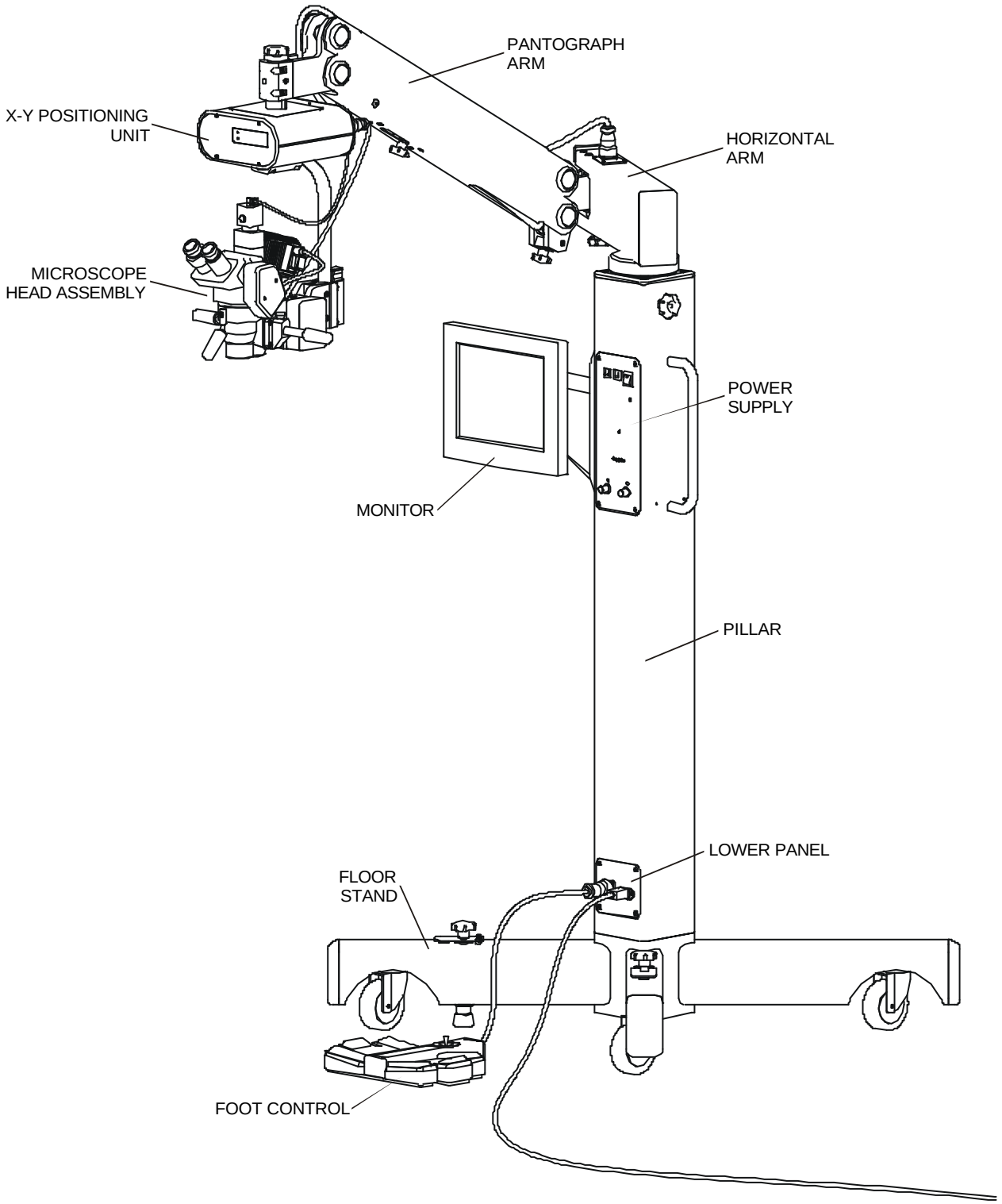
Environmental storage and packing conditions of 60-95% relative humidity and 10-40°C are recommended for this product.

No parts or accessories supplied with this microscope are supplied in a sterile condition.

Apart from those instructions within this manual, there are no user-serviceable parts in this microscope. Scan Optics will retain the discretion to advise whether any repairs may be taken out by external qualified technical personnel, or whether part(s) of the microscope must be returned to the manufacturer's premises for service or repairs to be carried out under warranty or otherwise. Where appropriately qualified technical personnel are identified by a user, and ratified by Scan Optics, then Scan Optics will make available on request any information which will assist in repairing the equipment.

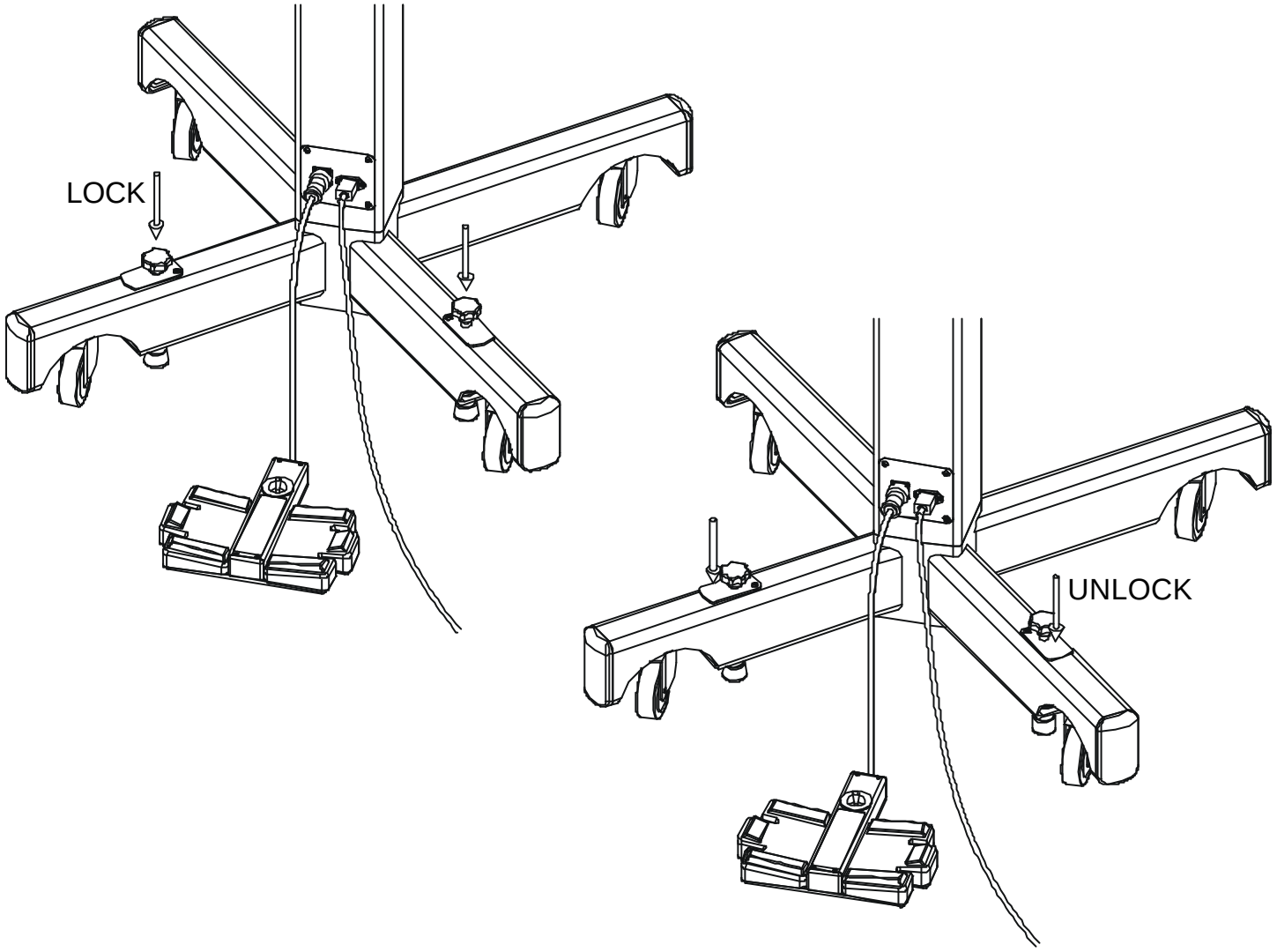
MICROSCOPE FEATURES

Please refer to the diagram below to help you identify the main assemblies of your SO-5800 microscope.



FLOOR STAND

The floor stand provides a stable platform for the microscope, enabling it to be moved freely and also to be locked in to position.



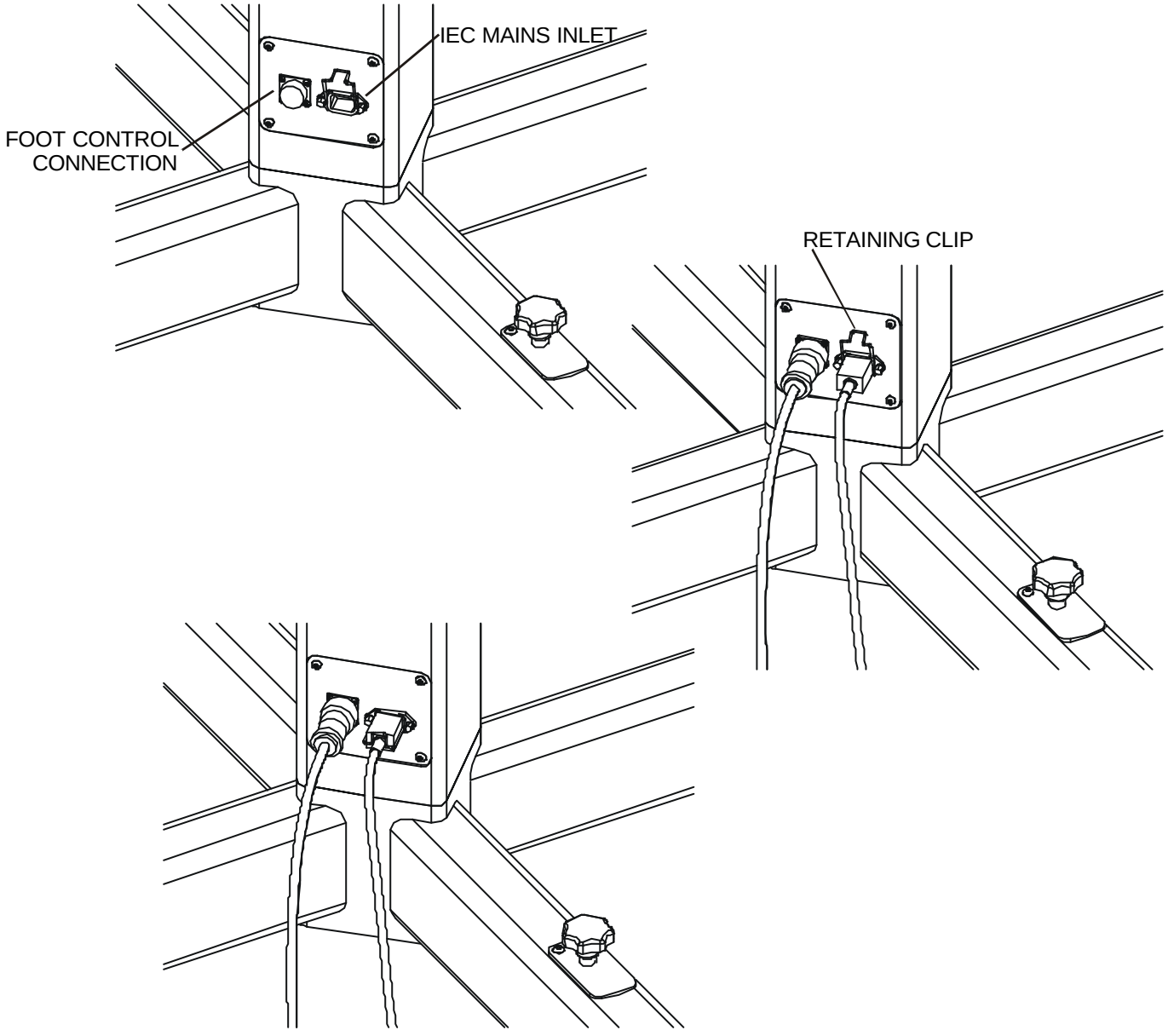
To move the floor stand, first fold the pantograph arms carefully back against the horizontal arm, and lock the arms to minimise the risk of accidental damage to the microscope head. Depress the latches marked on each of the legs in the diagram above to unlock the wheels. Then grip the handles on the side of the main pillar and move the floor stand as desired. To lock the floor stand depress the large black knobs as shown on the diagram. Note that no twisting of the knobs is necessary. To unlock the floor stand, simply depress the latches on each leg and the locks will spring up.

PILLAR

The pillar contains two panels, a lower panel for connecting to mains power and the foot control, and a power supply panel for controlling microscope functions.

LOWER PANEL

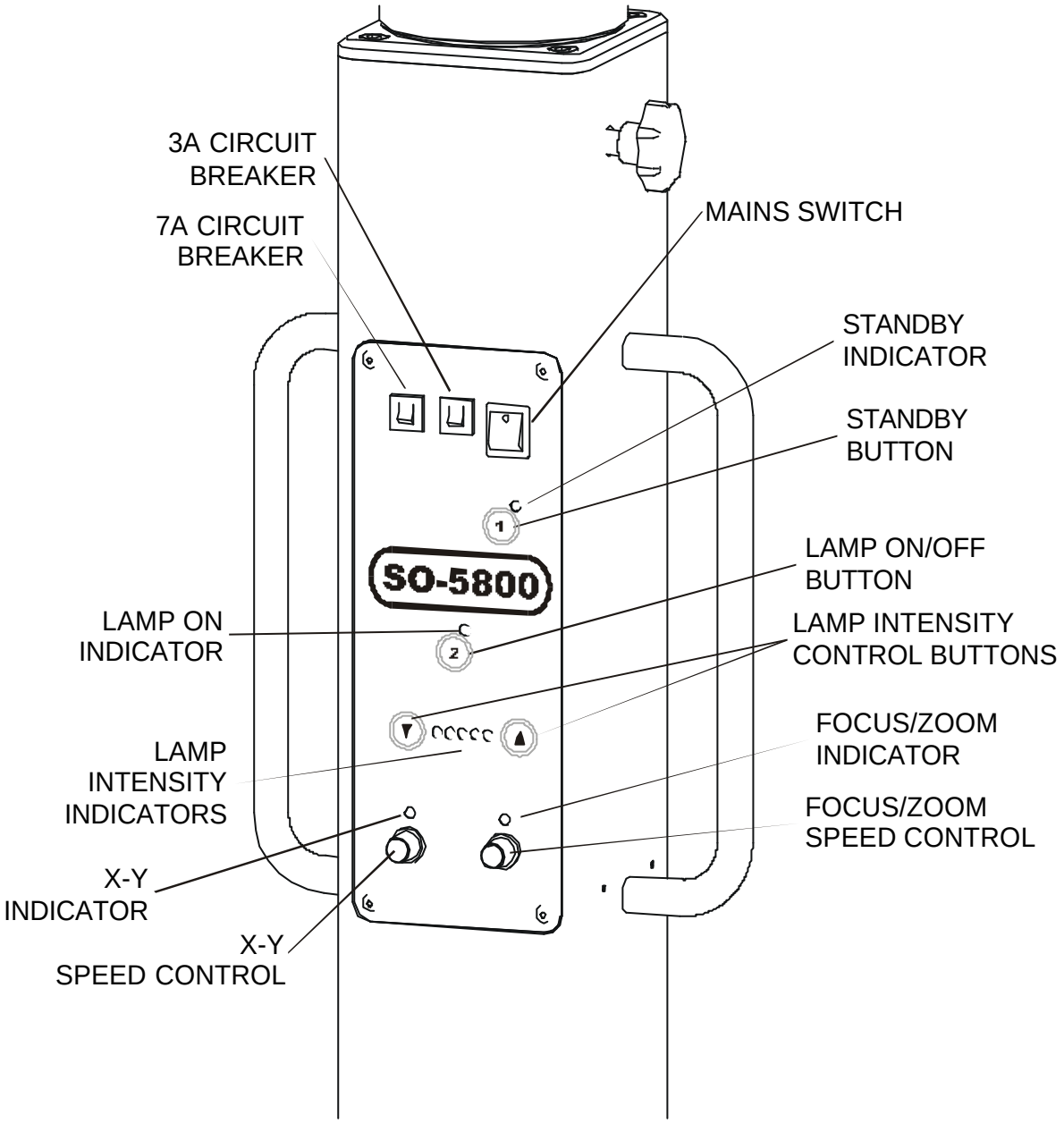
The foot control and IEC mains plug should be connected as shown in the diagram below. Note that the retaining clip should be used to avoid accidental removal of the mains plug.



When attaching the foot control cable, align the square feature on the plug with the recess on the panel socket. Insert the plug in the socket and rotate the housing clock-wise to secure the connection.

POWER SUPPLY

The power supply controls some of the most important functions of the SO-5800 microscope.



To switch the microscope on, depress the mains switch. An indicator on the switch will glow, indicating that power is available. Press the standby button ① once (the LED indicator will turn off) to allow microscope functions to be activated. Press the lamp button ② once (the LED indicator will come on) to turn the lamp on. The lamp intensity may be controlled in five discrete steps by depressing the ▲ or ▼ buttons as appropriate, while the intensity setting will be displayed by the indicator LEDs. If the standby button is depressed (its LED

indicator will turn on) the lamp will switch off, when the button is depressed again, the lamp will return to its previous intensity setting.

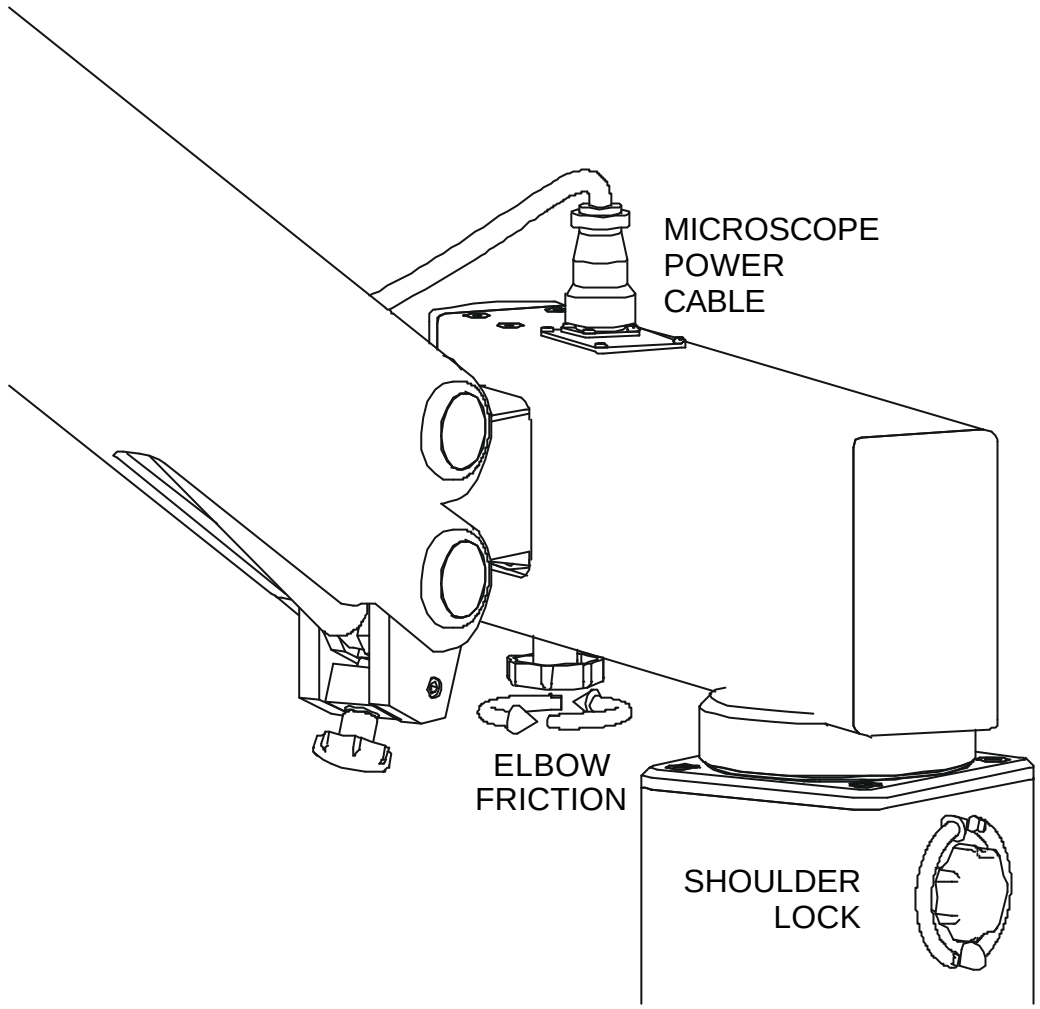
Speed of X-Y movement and focus/zoom movement may be controlled by rotating the control knobs clock-wise to increase speed or counter-clock-wise to decrease speed. Note that at extremely low speed settings, movement may be imperceptibly slow or completely absent.

The X-Y indicator will light up constantly when the foot control is used to position the microscope laterally. The indicator will flash when the return to centre function has been activated from the X-Y unit.

The Focus/zoom indicator will light up constantly when the foot control is used to focus the microscope up or down, or to zoom the microscope in or out.

HORIZONTAL ARM

The horizontal arm rotates about the top of the pillar and provides a connection interface for the main microscope power cable. Stops are fitted to prevent the arm rotating continuously around the pillar; this prevents the internal cabling from twisting. The range of movement allowed is 300°.



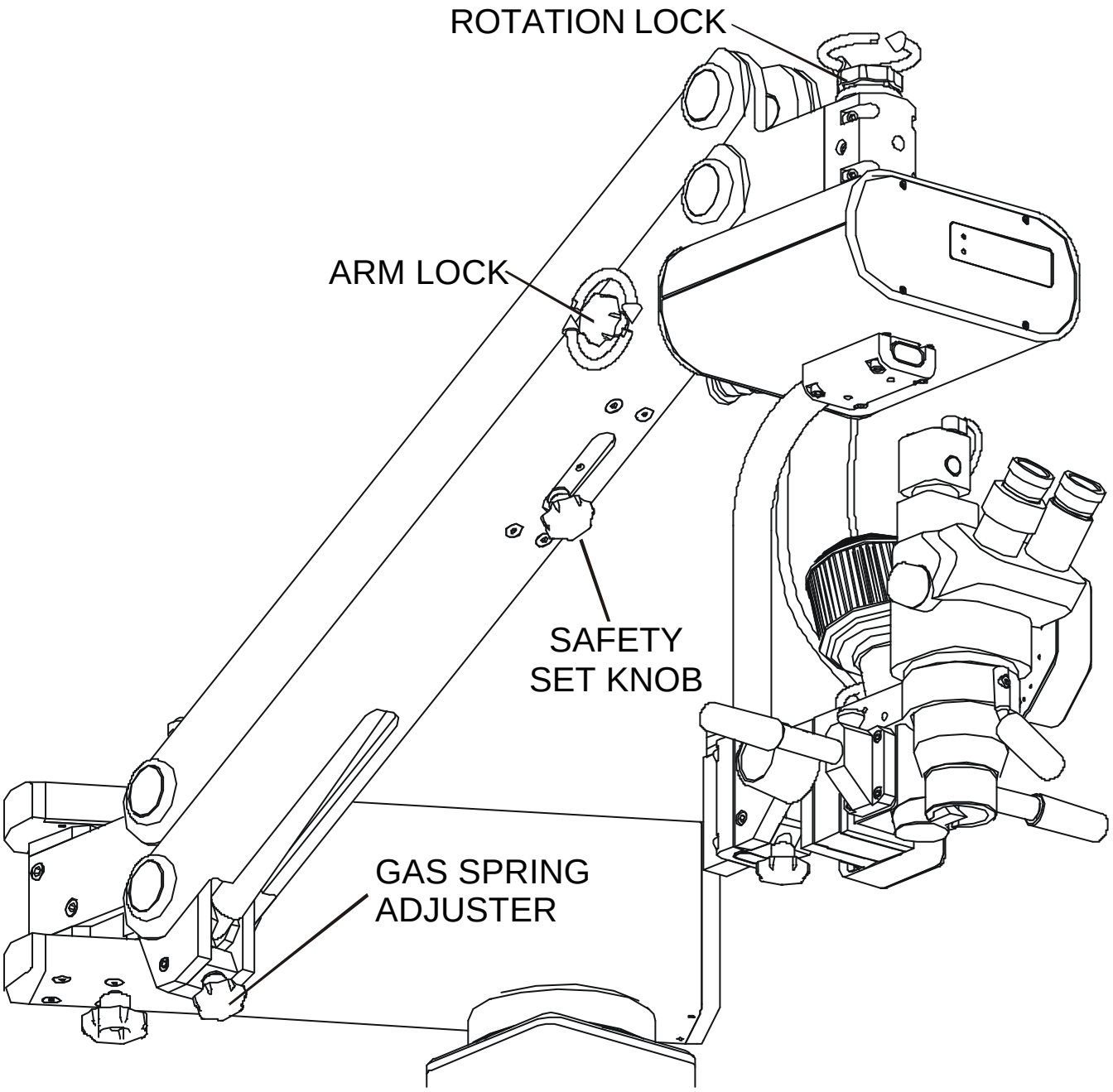
The knob at the top of the pillar labelled ‘SHOULDER LOCK’ enables the horizontal arm to be fixed in position. To lock the arm, rotate the knob in clock-wise fashion.

To connect the microscope power cable to the socket marked ‘MICROSCOPE POWER OUT’ align the square feature on the plug with the recess on the panel socket. Insert the plug in the socket and rotate the housing clock-wise to secure the connection.

A knob marked ‘ELBOW FRICTION’ is provided beneath the end of the horizontal arm and allows friction to be applied to the swivel joint between the pantograph arm and the horizontal arm. To increase friction, rotate the knob in clock-wise fashion when viewed from beneath the horizontal arm.

PANTOGRAPH ARM

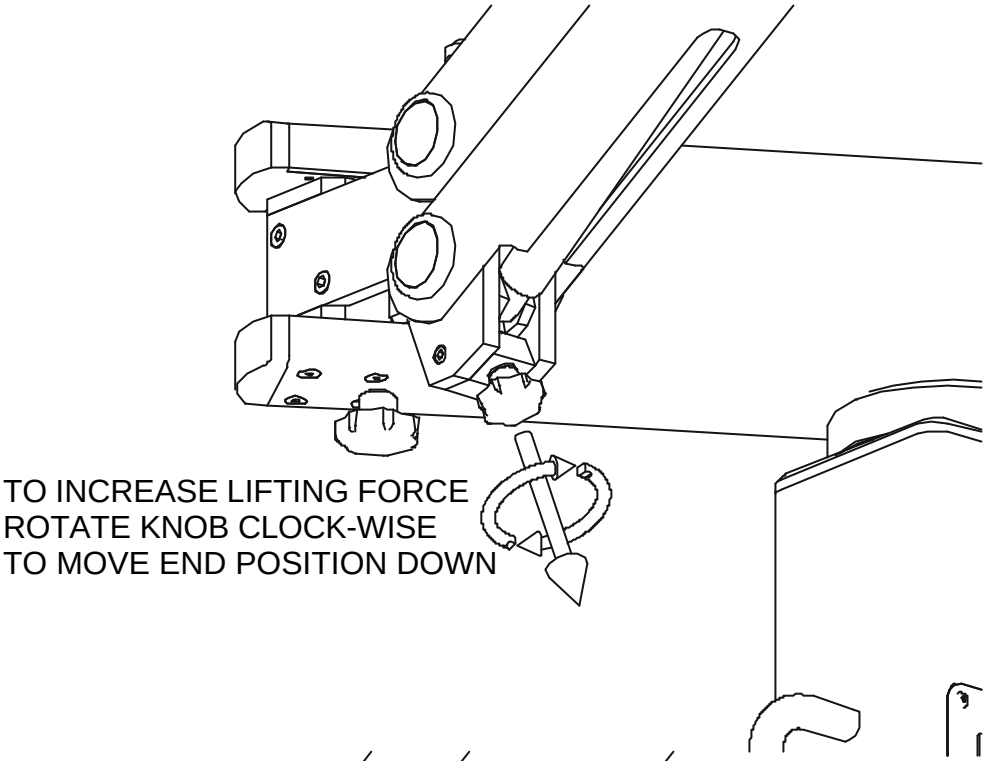
The pantograph arm rotates about the end of the horizontal arm and also provides a means for manually raising and lowering the microscope head. The pantograph arm includes features that enable the user to achieve the required type and feel of microscope movement.



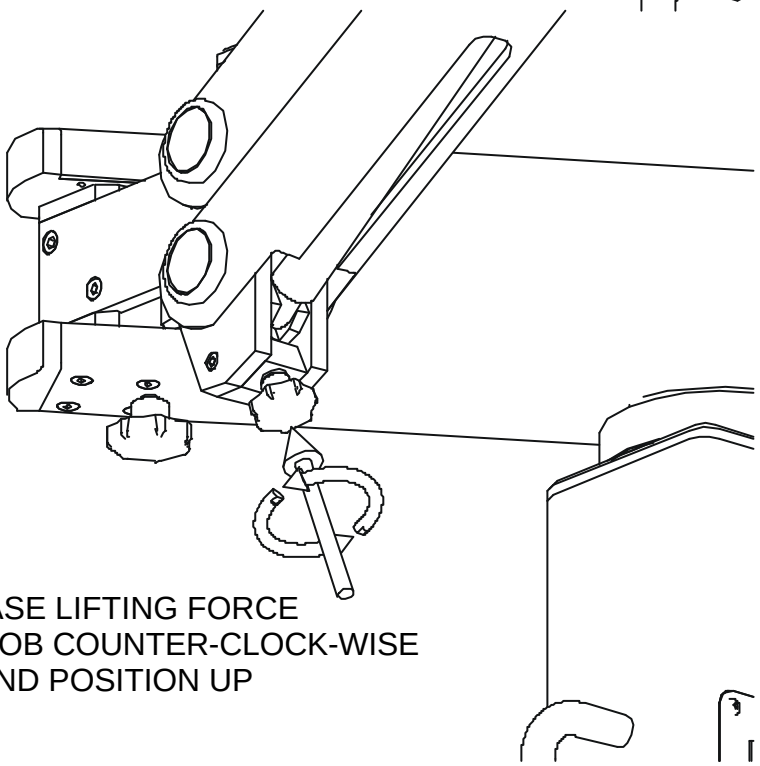
To lock the arm in a particular vertical position, simply rotate the 'ARM LOCK' knob clock-wise. To lock the rotational movement of the X-Y unit and microscope head below the end of the pantograph arm, rotate the 'ROTATION LOCK' knob clock-wise.

GAS SPRING ADJUSTMENT

A gas spring inside the pantograph arm provides lifting force, which is able to support the weight of the X-Y unit and microscope head at the end of the arm. By moving the end position of the gas spring, the amount of lifting force can be varied depending on the preference of the user or to suit the weight of additional accessories which may be placed on the microscope head assembly.



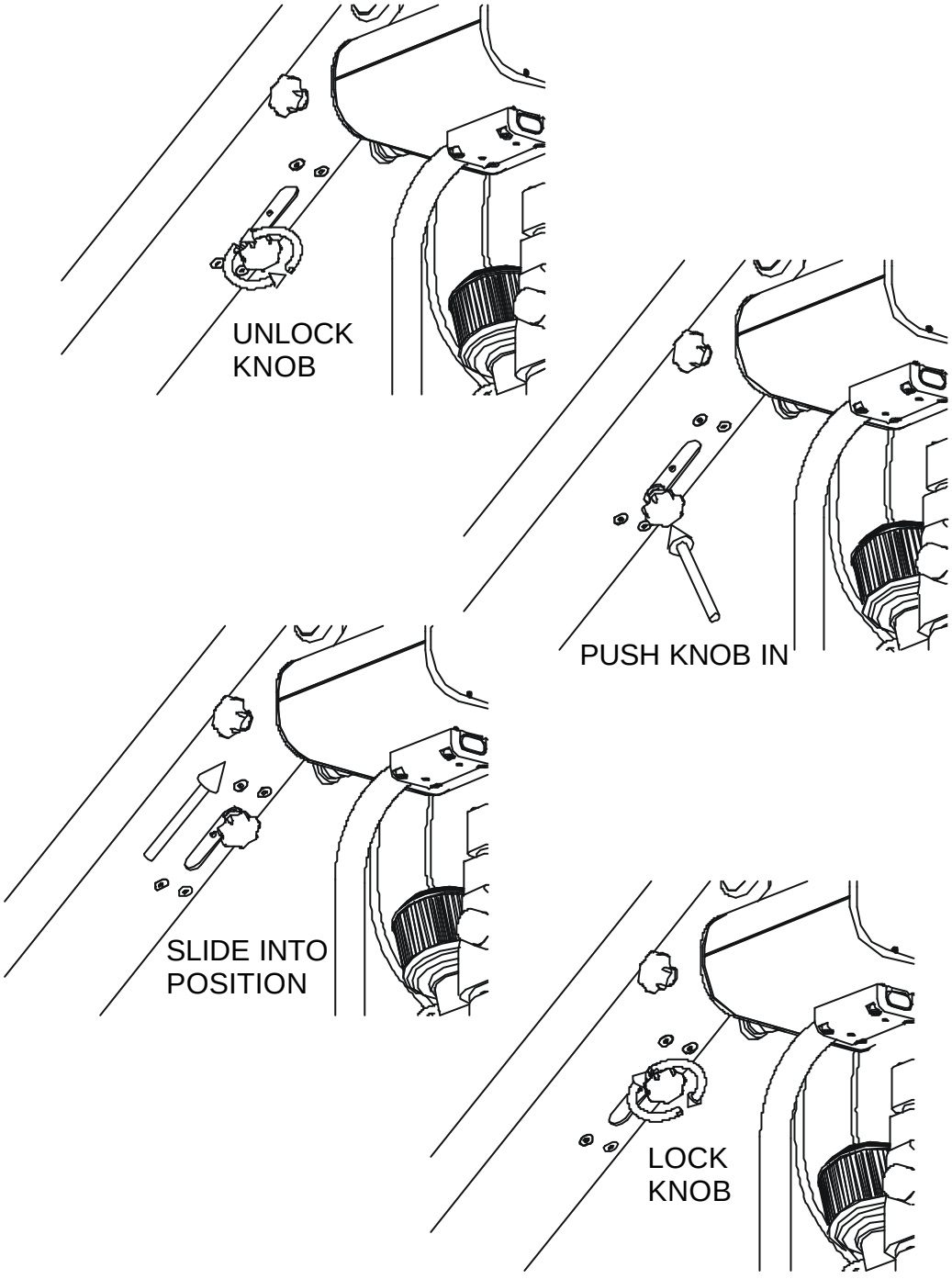
TO INCREASE LIFTING FORCE
ROTATE KNOB CLOCK-WISE
TO MOVE END POSITION DOWN



TO DECREASE LIFTING FORCE
ROTATE KNOB COUNTER-CLOCK-WISE
TO MOVE END POSITION UP

SAFETY MECHANISM

The SO-5800 is fitted with a safety stop mechanism that enables the user to pre-set a particular height below which the pantograph arm will not move. Where the knob position is set closest to the horizontal arm end, there is no impediment to movement. When the knob is locked closest to the microscope head end, there will be almost no movement allowed in the pantograph arm below its rest (UP) position. Locations in between will allow a limited rage of movement. Note that the knob MUST be locked in position for the safety mechanism to take effect.

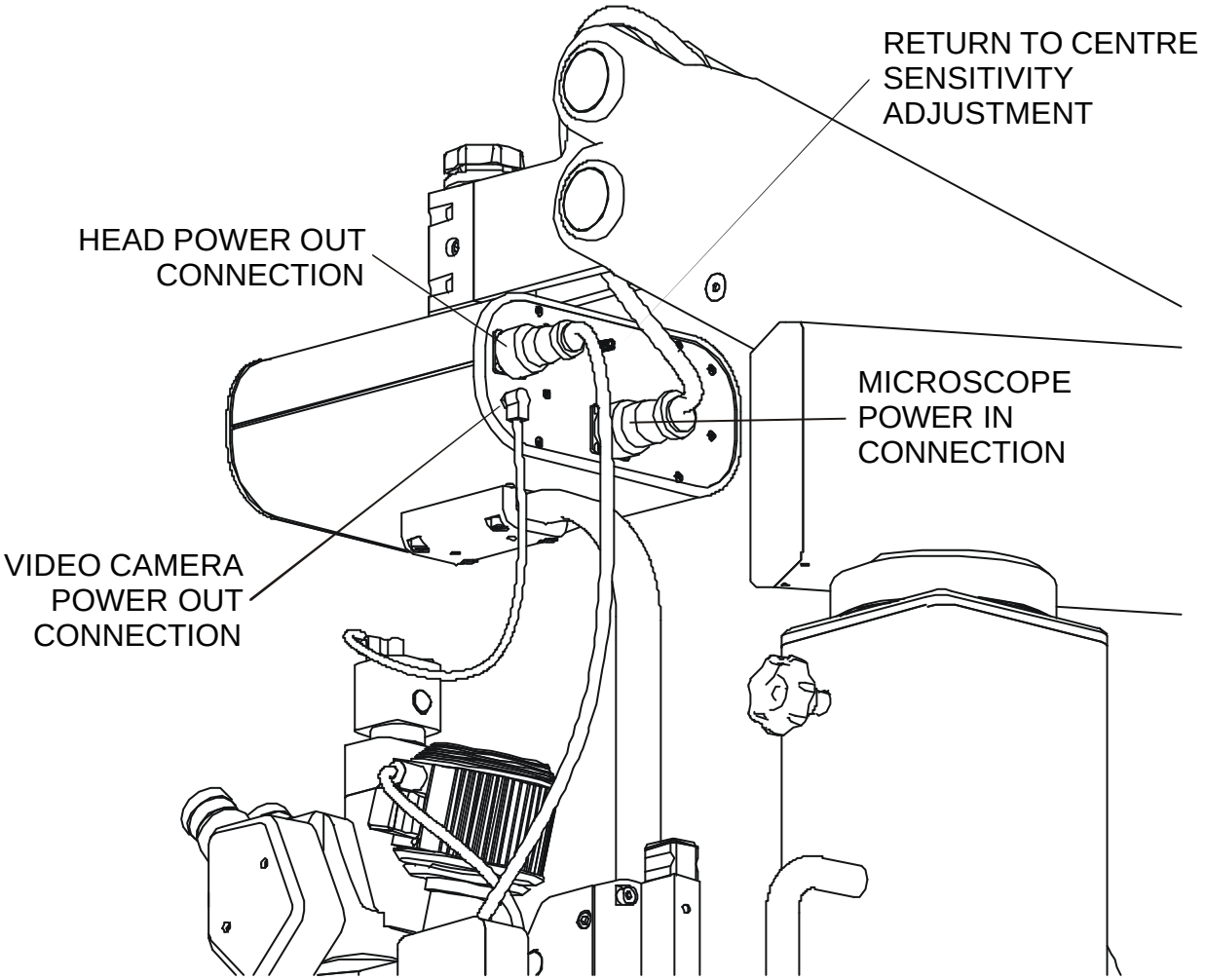


X-Y UNIT

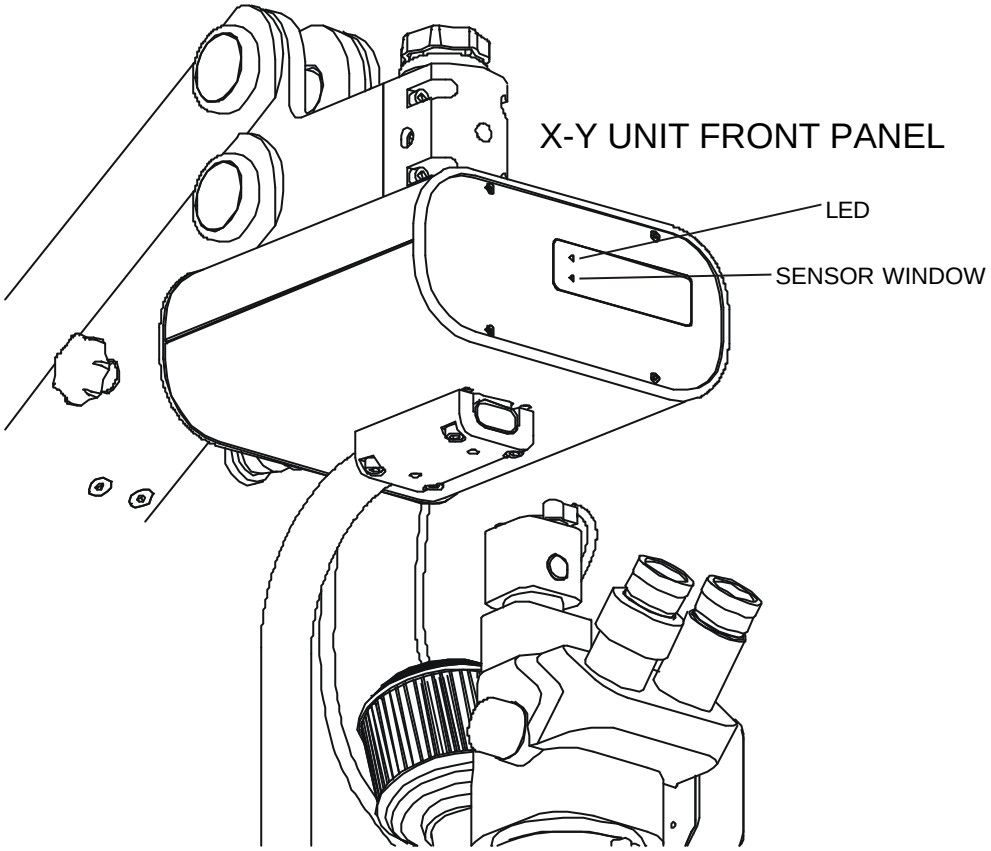
The X-Y unit is positioned below the rotating joint at the end of the pantograph arm. This unit allows the user to move the microscope head laterally, by means of the joystick on the foot control. To move the head to the right, simply move the joystick to the right, to move the head forward, move the joystick forward, and so on. Movement combinations may also be achieved by moving the joystick diagonally. Speed of X-Y movement is controlled using the knob on the main power supply panel.

The X-Y unit also acts as an interface for distributing power to the microscope head and video camera as well as the X-Y unit itself. These connections are labelled on the rear panel of the X-Y unit. All voltages in this region are <15Vdc

X-Y UNIT REAR PANEL


RETURN TO CENTRE SENSITIVITY ADJUSTMENT
HEAD POWER OUT CONNECTION
MICROSCOPE POWER IN CONNECTION
VIDEO CAMERA POWER OUT CONNECTION

A return to centre (RTC) function built in to the X-Y unit allows the user to return the microscope head to a home position, centred on the middle of the range of movement. To activate this function, move a hand or object close to the small circular window on the front panel of the X-Y unit. The RTC function will activate after approximately two seconds, to prevent accidental activation. The LED above the window will flash intermittently while the unit is returning to centre. This LED will also provide a continuous light when the joystick on the foot control is used to drive the head in normal fashion.

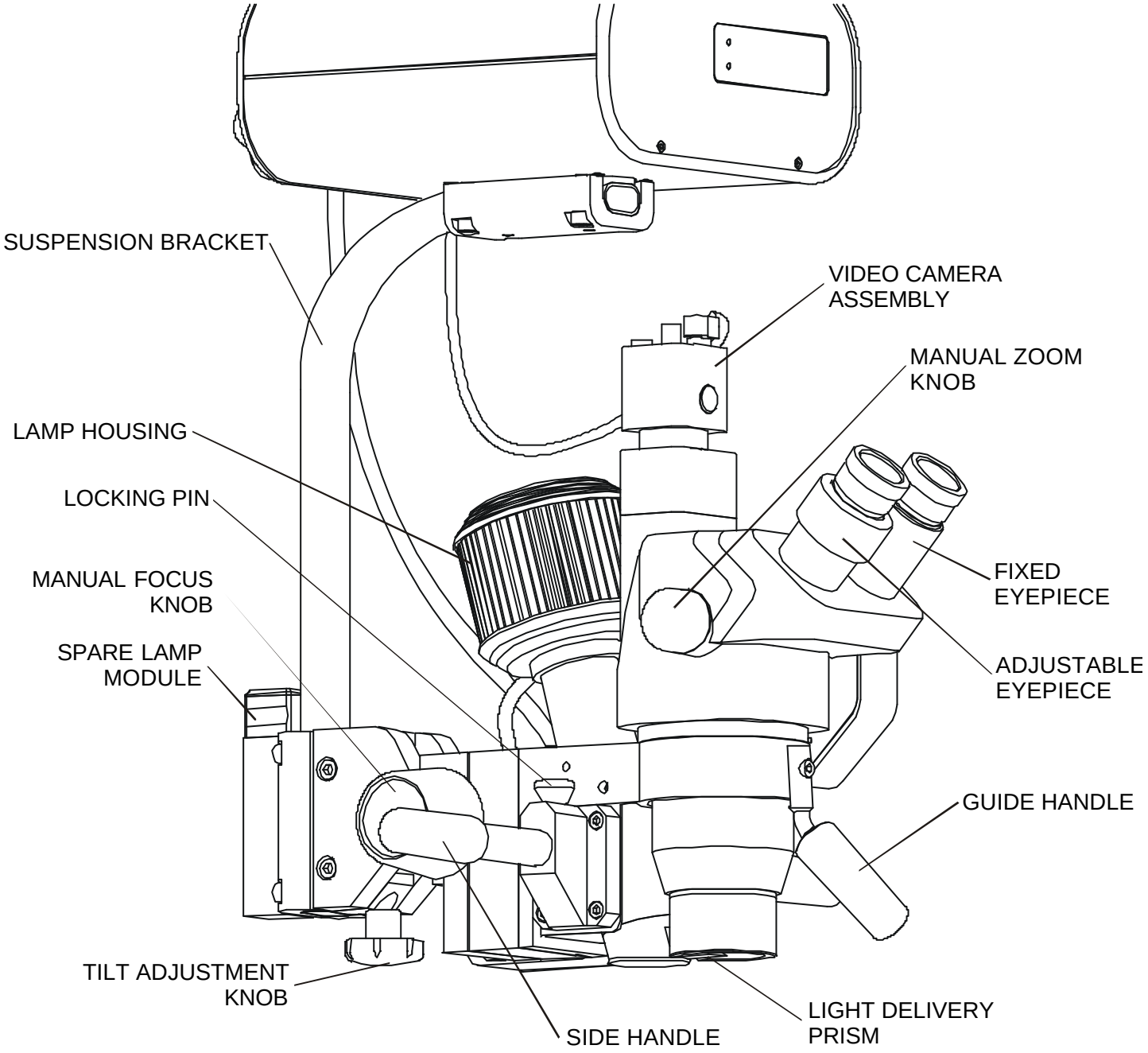


The return to centre function is activated when light is blocked from entering through the sensor window by the user's hand or another object. The sensitivity of this detector may be adjusted by rotating the knob on the rear panel of the X-Y unit. The ideal setting is such that the user need not touch the window but the sensitivity is not so fine as to cause nuisance activation. This sensitivity may need adjustment if the ambient lighting conditions where the microscope is used have changed. **If the microscope is used in darkened conditions, it is recommended that the RTC function is turned off by adjusting the sensitivity, to prevent accidental engagement. The sensitivity knob itself may then be used to return the microscope to centre.** Note that on some model SO-5800 microscopes this sensitivity is adjusted by inserting a Philips head screwdriver through a hole in the upper housing of the X-Y unit. In this case the screwdriver engages in a trim pot which may be rotated, otherwise the effect is identical.

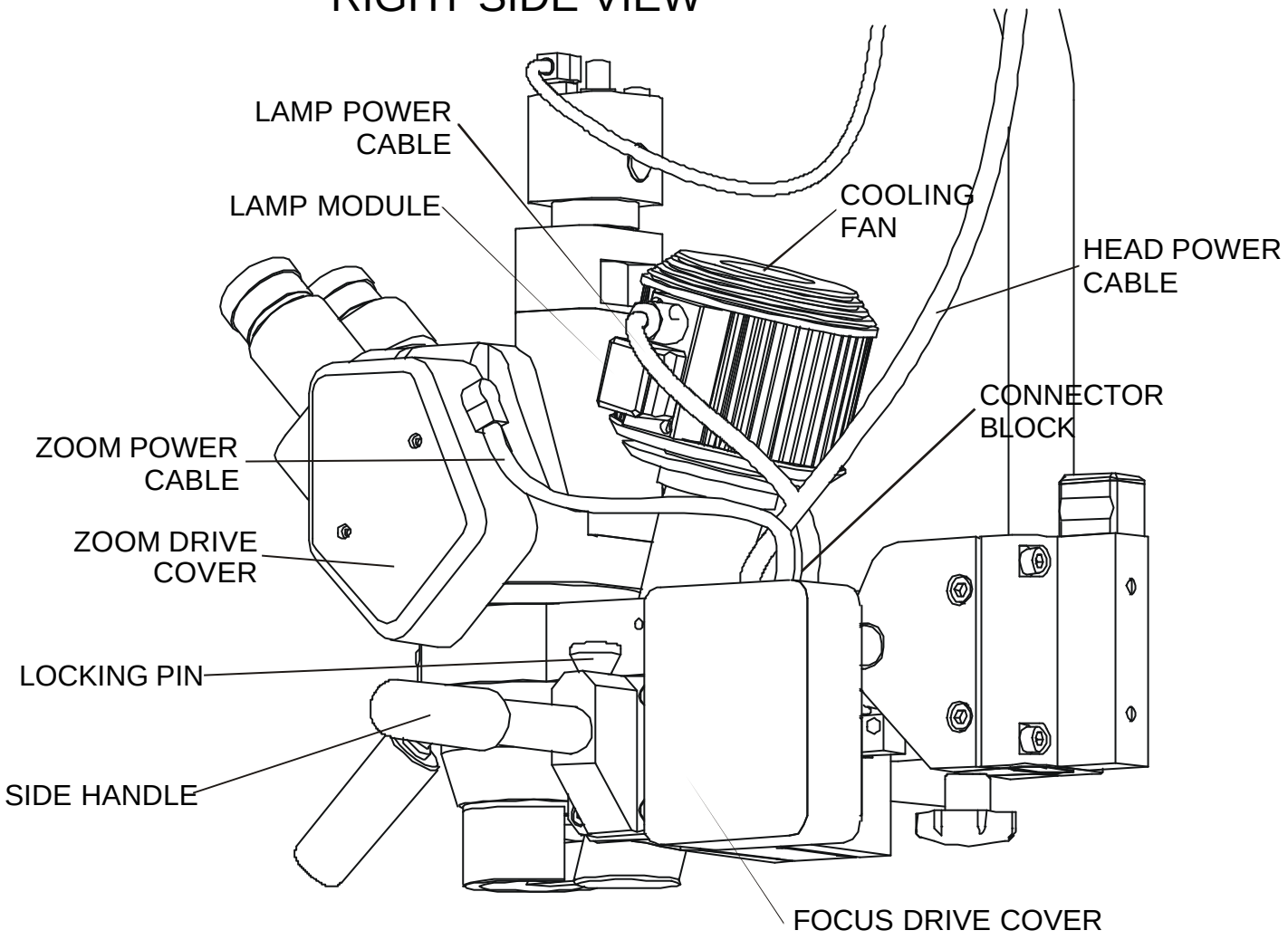
MICROSCOPE HEAD ASSEMBLY

The microscope head is suspended beneath the X-Y unit by means of a rigid bracket, which is clamped at each end. The head assembly includes viewing optics, light source and various fittings and mechanisms to aid the user in positioning the microscope.

MICROSCOPE HEAD ASSEMBLY
LEFT SIDE VIEW



MICROSCOPE HEAD ASSEMBLY
RIGHT SIDE VIEW



POWER SYSTEM

Power to the head is delivered from the X-Y unit in to a connector block, which distributes power to the various systems. All power in this region is < 15Vdc. The lamp power cable connects the lamp housing to the connector block and provides voltage for the halogen lamp and its cooling fan. Power is also provided to the zoom drive motor and internally to the focus drive motor.

LIGHTING SYSTEM

A lamp housing provides a means for mounting a 50W halogen lamp, which delivers light to the viewing field through a series of lenses, filters and a prism. The lamp is supplied fixed in a holder, which is then mounted in a module – this ensures that the amount of light delivered is maximised. The cooling fan enables the lamp to be run at maximum intensity if desired without heating the housing to extreme levels. The prism is positioned to optimise red reflex – this means that the prism tip may be visible when the viewing field is maximised, that is at the lowest magnification settings.

FOCUS MECHANISM

A geared dc motor provides the means for driving the head assembly up and down for focussing via foot control. The motor is located inside the focus drive cover. Focus speed may be adjusted by rotating the knob on the main power supply panel. The manual knob located on the left side may be used instead of the foot control, if this is a preference of the user or in the event of a power failure. In this case the manual knob will simply drive the motor. When using the manual focus knob, do not attempt to drive the focus using the foot control – this will strip the drive gears. The range of focus movement is approximately 45 millimetres. A visual guide to the centre of the focus range is provided in the form of black dots marked on the side of the focus mechanism. When the dots are aligned, the focus system is set to the centre of the range.

ZOOM MECHANISM

The zoom mechanism can also be driven by foot control or by using the manual zoom knob on the left side of the microscope head. A geared dc motor located inside the zoom cover provides the means for foot controlled zooming. When using the manual zoom, the manual knob will simply drive the motor. Do not attempt to drive the zoom simultaneously using the foot control and the manual knob. This will strip the drive gears. When the standard 0.62x objective lens is used with this microscope, the range of magnification controlled by the zoom mechanism is between 4x and 25x.

VIEWING SYSTEM

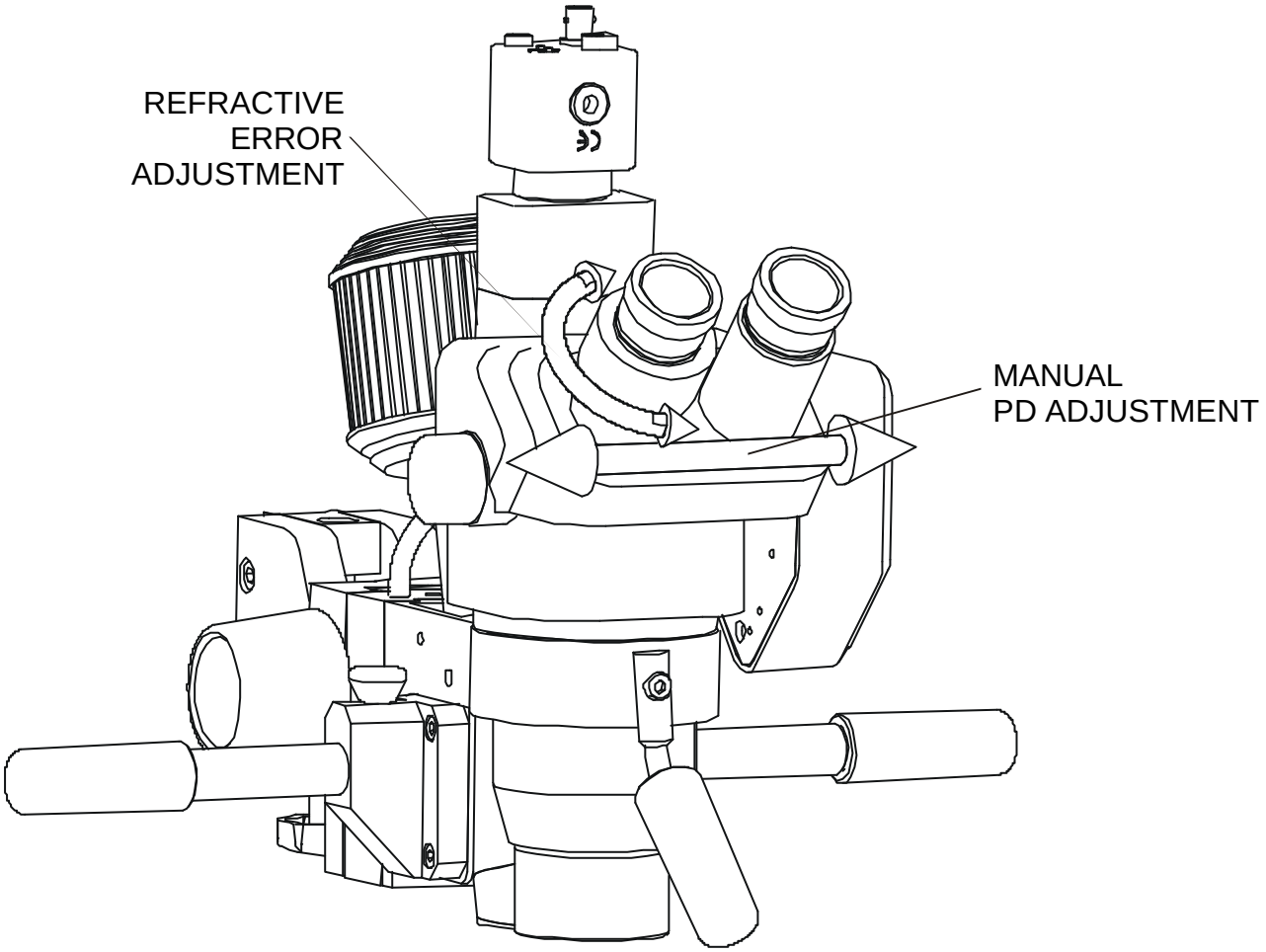
The optical head provides the means for viewing the subject matter under magnification. There are adjustments available to suit the user in order to achieve the clearest image in the most comfortable circumstances. The pupillary distance (PD) may be adjusted manually by sliding one eyepiece sideways – the other eyepiece will move simultaneously in the opposite direction. On microscopes fitted with the optional PD adjuster, this is achieved by rotating the knob that protrudes to the side of the eyepieces.

The adjustable eyepiece may be used to compensate for any refractive error difference between the left and right eye of the user. First, rotate the adjustable (left) eyepiece so that the scale is set to zero. Then focus the microscope while closing the left eye and looking only through the right eyepiece. When the microscope is focussed, close the right eye and look with the left eye through the left eyepiece, and rotate the adjusting ring until the left eye is focussed.

Rubber eyepiece shields are provided to help the user view through the eyepieces without being disturbed by ambient light. These shields are easily removed or added by hand, and can be reversed to provide an aid to spectacle wearers.

Eyepiece caps are provided to protect dust entering the eyepiece tubes when the microscope is not in use. Simply remove the eyepieces and replace them in their protective wrapping, and insert the eyepiece caps in their place.

The working distance is fixed at 180 millimetres, where the standard 0.62x objective is supplied. The working distance can only be adjusted by swapping the objective lens to that of another magnification.



TILT ADJUSTMENT

The entire head assembly may be tilted some five degrees forward or up to forty five degrees back by rotating the tilt adjustment knob located beneath the suspension bracket. This can be of some assistance to users of a shorter stature who wish to use the microscope while seated.

Note that on some models, the tilt knob is located in front of the bottom end of the suspension bracket, and not below it.

HANDLES

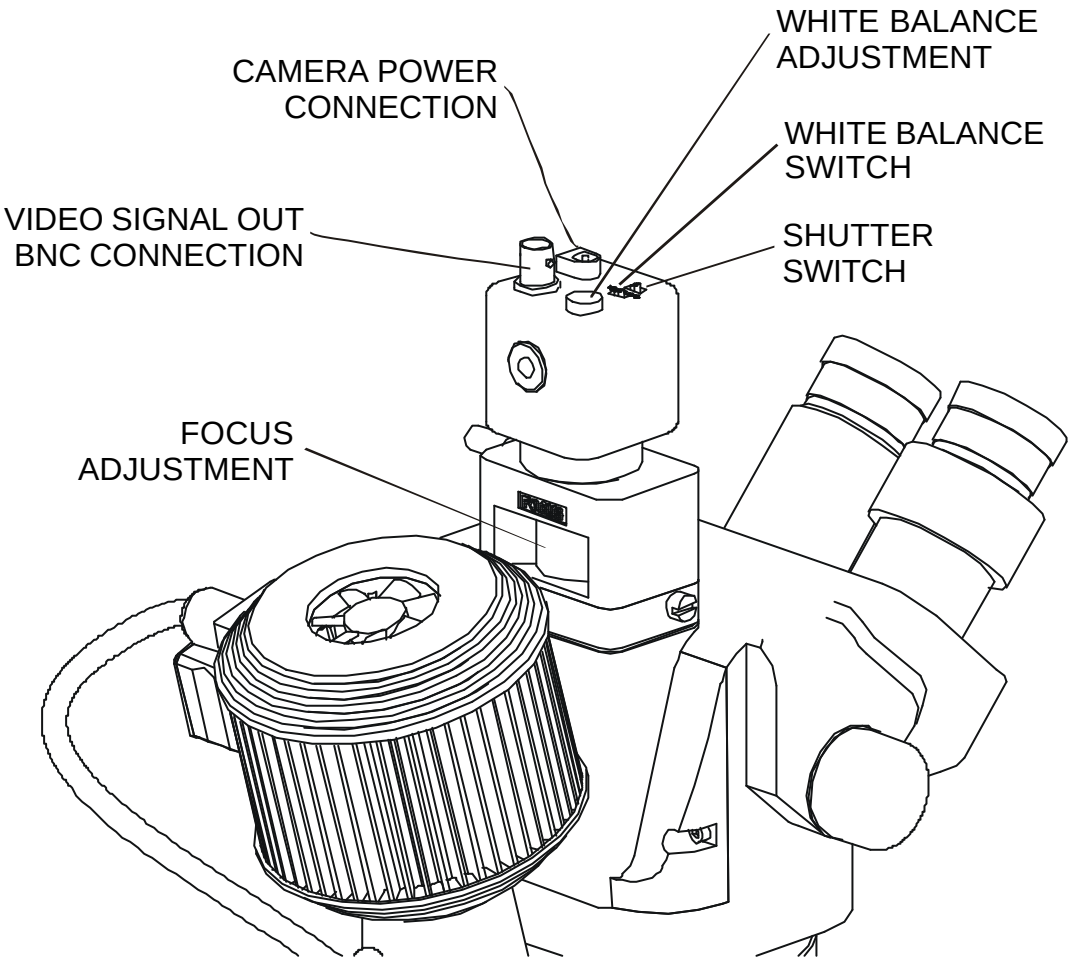
The SO-5800 is provided with two side handles and a front guide handle which enable the user to manoeuvre the microscope into position, within the limitations of the settings of the various locking knobs. The front guide handle may be removed if desired by unscrewing the socket head cap screw that fixes it to the front of the microscope head mounting bracket. The side handles may be removed first by removing the locking pins then sliding the handles out. It is necessary to remove one side handle if the assistant microscope is to be mounted on the side of the microscope head assembly.

Note that sterilisable covers are provided which fit the side/guide handles, as well as covers for the manual zoom and focus knobs, and the PD adjuster knob, if fitted. This enables the user to use the microscope in a surgical environment, if the covers are sterilised correctly.

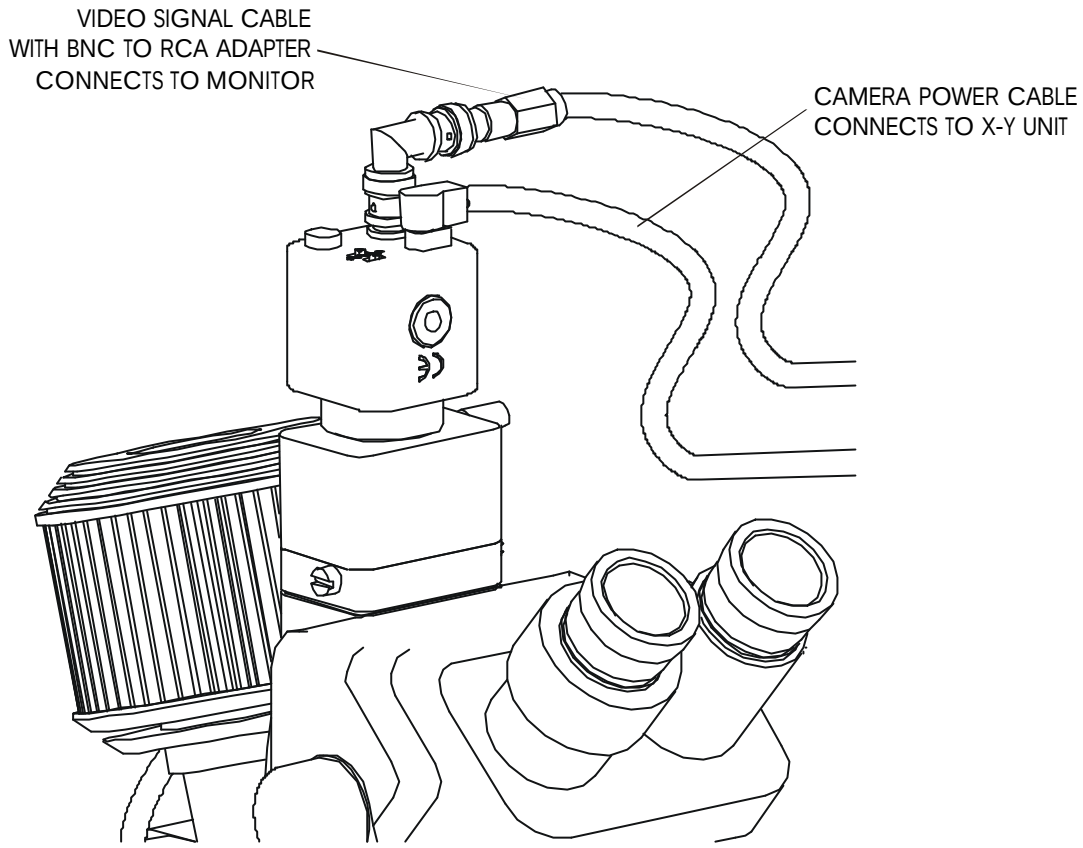
VIDEO SYSTEM

The SO-5800 microscope comes fitted with a video system enabling images from a coaxial video camera to be displayed on a monitor mounted from the main pillar. The SO-5800 can thus be used as a teaching microscope, or the monitor used simply to display surgery for the benefit of theatre staff.

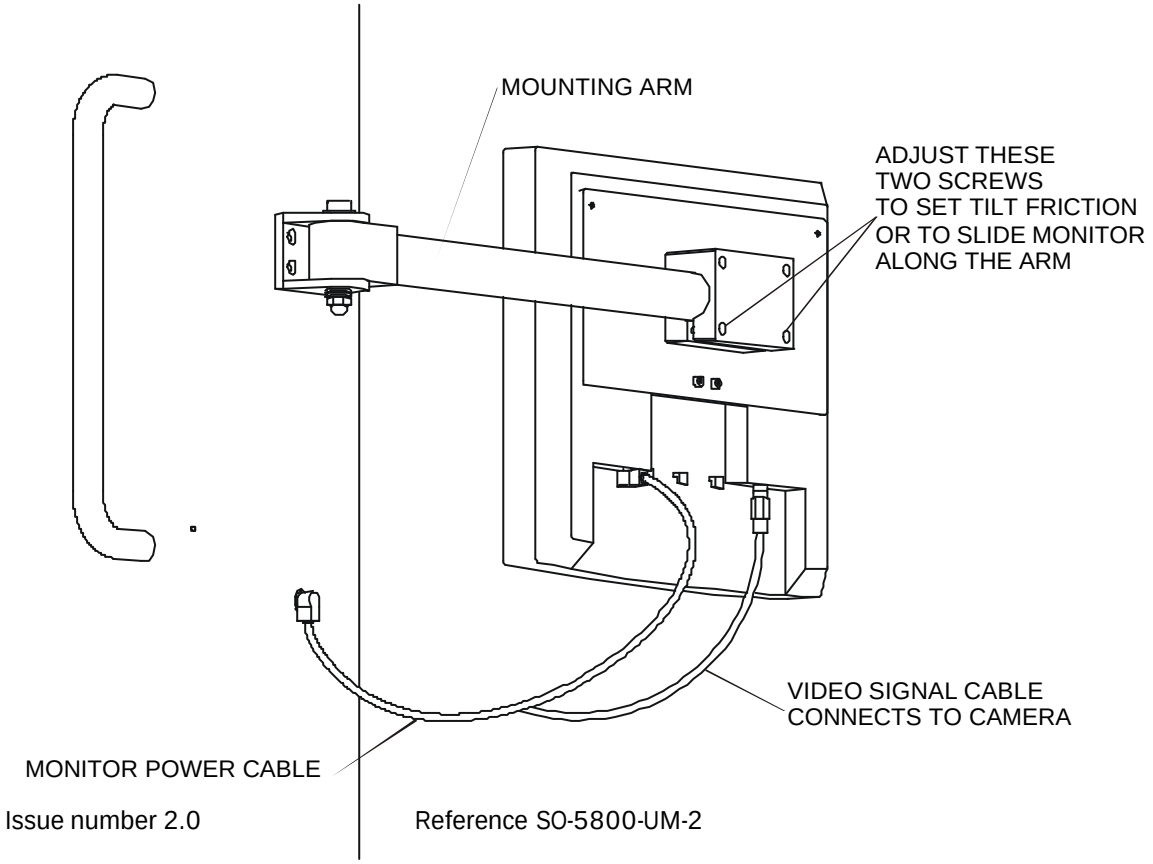
The SO-5800 is shipped with camera and video settings pre-set to suit local conditions. These settings can however be adjusted to suit user preferences. For a detailed reference to the settings available for camera and monitor, please refer to the separate instructional leaflets provided which contain all relevant information.



To connect the video system, first connect the video signal cable between the camera and the monitor. First pass the cable through the clip on the side of the X-Y unit. Rotate the right-angled connector at the camera end to ensure that the cable does not interfere with the upper end of the focus range due to the proximity of the X-Y unit. Then simply connect the camera power cable between the camera and the X-Y unit, and connect the monitor power cable between the monitor and the connector on the back of the main pillar.

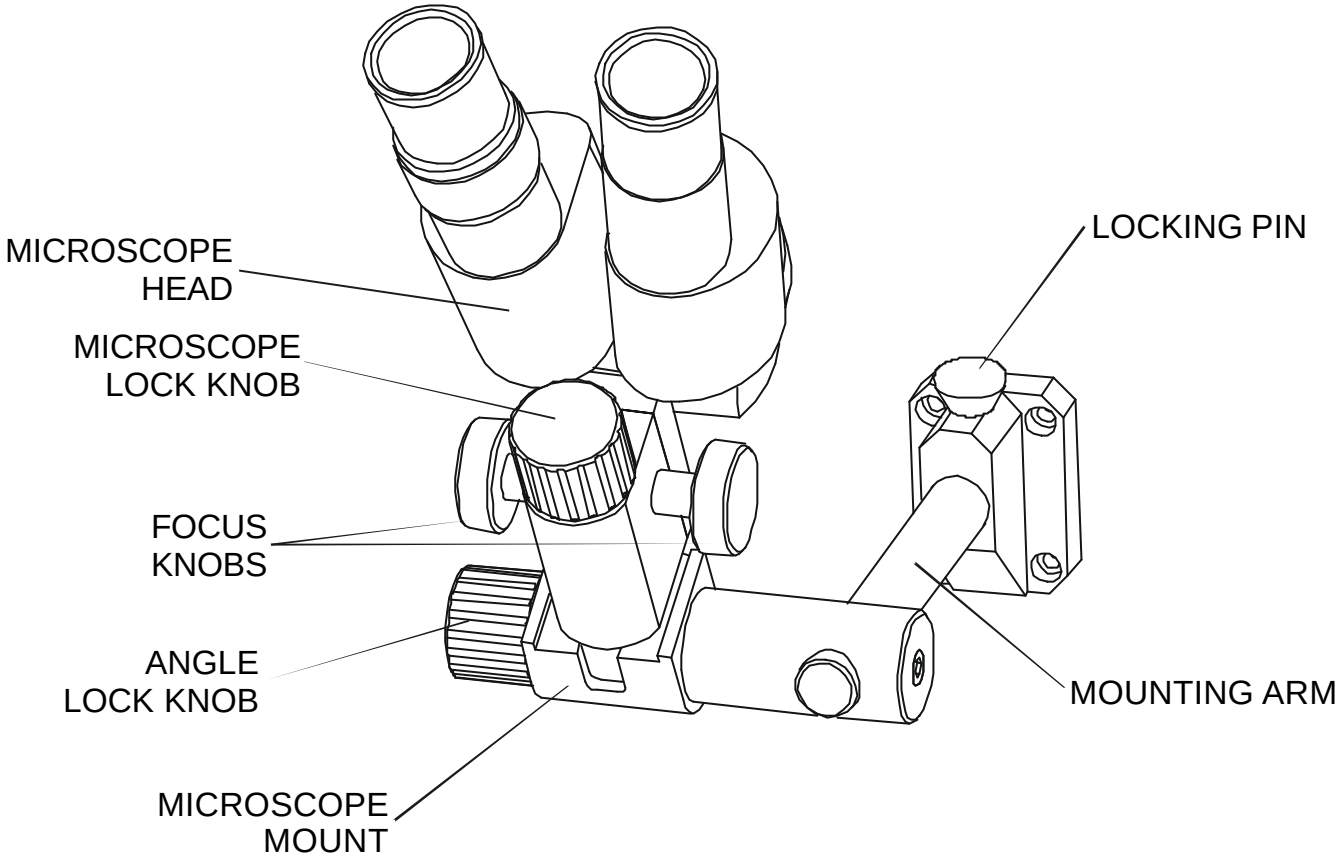


The monitor may be tilted back or forward with friction adjustable by tightening or loosening the lower two screws on the clamping bracket. The monitor may also be slid along the arm or swung from one side to the other simply by rotating the mounting arm.



ASSISTANT MICROSCOPE

The assistant microscope provided with the SO-5800 allows an observer to view procedures under magnification within close proximity of the operating field. In order to fit the assistant microscope, one side arm must first be removed by removing the locking pin and sliding the arm out. The same locking pin must be used to retain the mounting arm of the assistant microscope when it is assembled on the left or right side of the main microscope head.



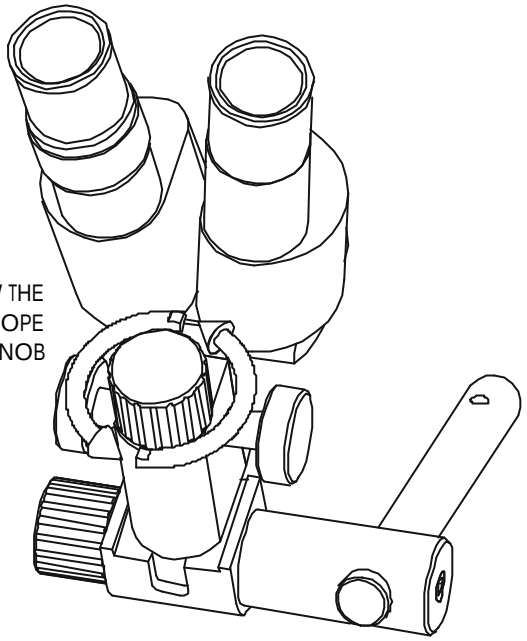
Sterilisable covers are provided to fit over the focus knobs.

Pupillary distance adjustment is performed manually, but the eyepieces are not geared together. For the best user comfort, ensure that the eyepieces are equidistant from the central axis of the main optical path.

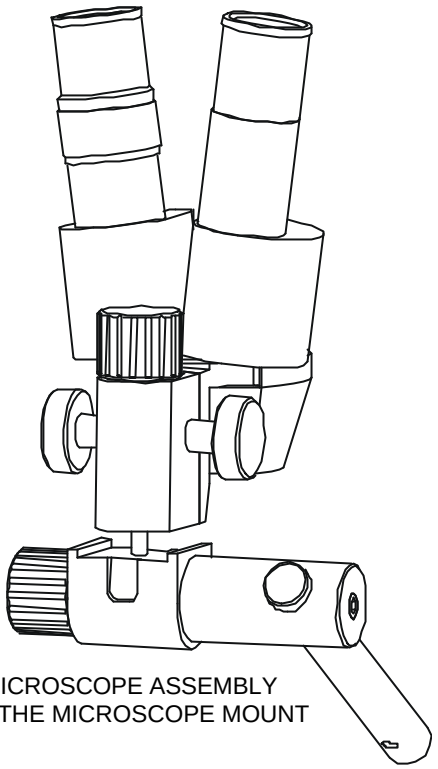
The adjustable eyepiece may be used to compensate for any refractive error difference between the left and right eye of the user. First, rotate the adjustable (left) eyepiece so that there are equal amounts of adjustment on either side. Then focus the microscope while closing the left eye and looking only through the right eyepiece. When the microscope is focussed, close the right eye and look with the left eye through the left eyepiece, and rotate the adjusting ring until the left eye is focussed.

When the microscope is fitted to the side of the main microscope head, a tilt angle of approximately 30 degrees will enable the visual field of the assistant microscope to match that of the main microscope head. To adjust this angle, loosen the angle lock knob while holding the microscope head, tilt the head to the appropriate angle and lock it again. Small sideways adjustments of the visual field can be achieved by loosening the microscope lock knob and rotating the microscope head about its mounting axis. When the fields are aligned correctly, tighten the microscope lock knob once again.

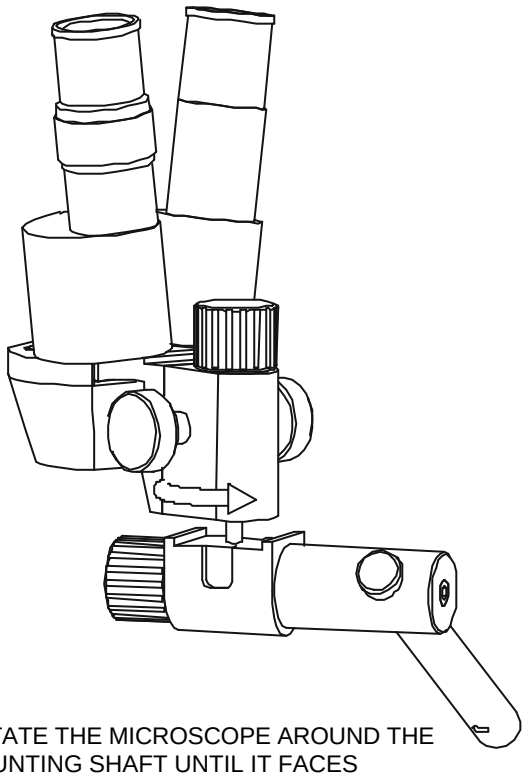
The assistant microscope may be configured to mount on either the left or right side of the main microscope head. The first diagram shows the head configured to fit on the right hand side of the microscope head. In order to swap the mounting configuration follow the diagrams shown.



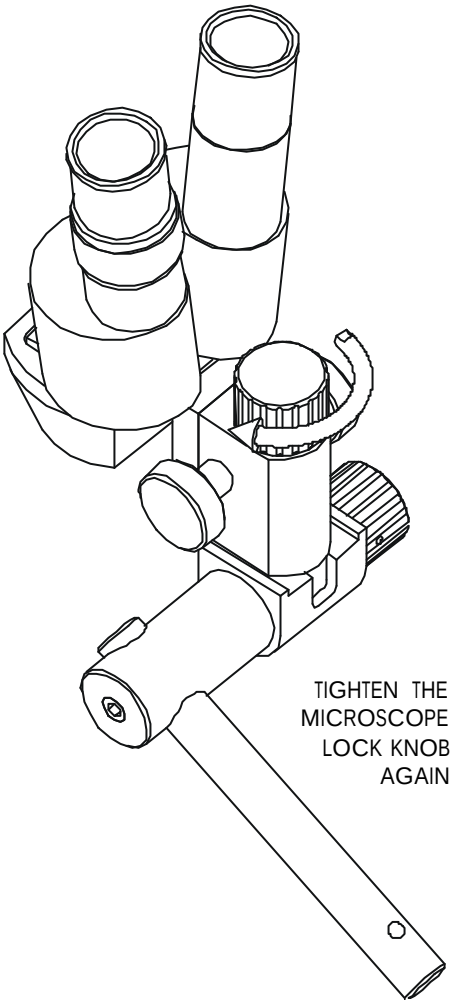
UNSCREW THE
MICROSCOPE
LOCK KNOB



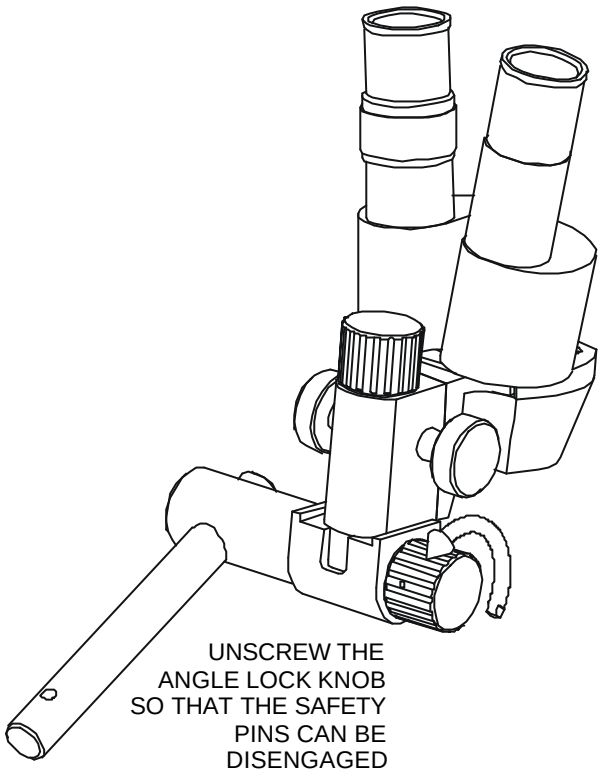
LIFT THE MICROSCOPE ASSEMBLY
CLEAR OF THE MICROSCOPE MOUNT



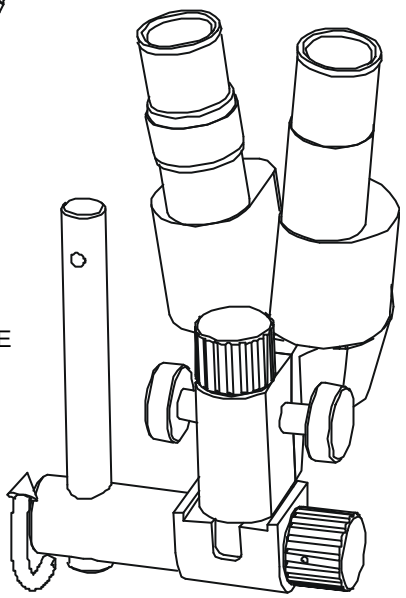
ROTATE THE MICROSCOPE AROUND THE
MOUNTING SHAFT UNTIL IT FACES
THE OPPOSITE DIRECTION



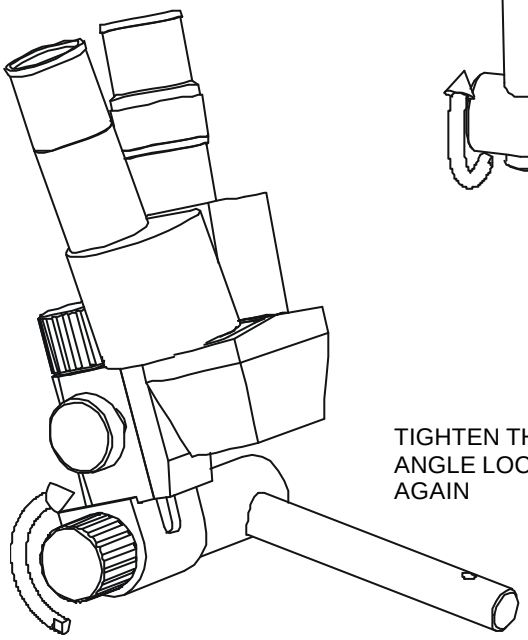
TIGHTEN THE
MICROSCOPE
LOCK KNOB
AGAIN



UNSCREW THE
ANGLE LOCK KNOB
SO THAT THE SAFETY
PINS CAN BE
DISENGAGED



ROTATE THE
MOUNTING
ARM

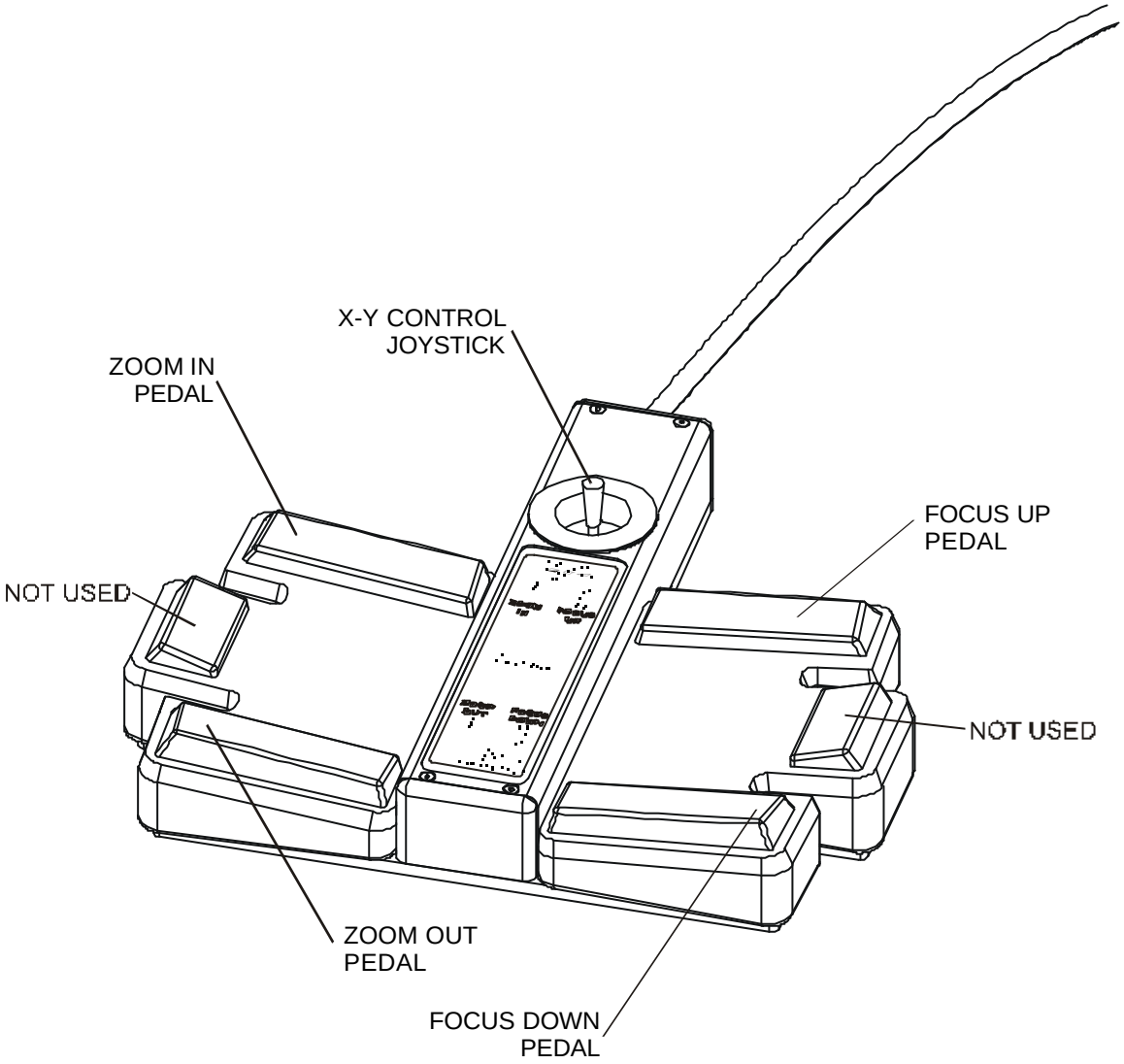


TIGHTEN THE
ANGLE LOCK KNOB
AGAIN

FOOT CONTROL

The SO-5800 foot control allows the user to focus and zoom the main microscope by depressing foot switches and to move the microscope laterally by foot movement of a joystick.

Note that on some models, the cable exit is from the other end of the foot control, in all other respects the functions are the same.



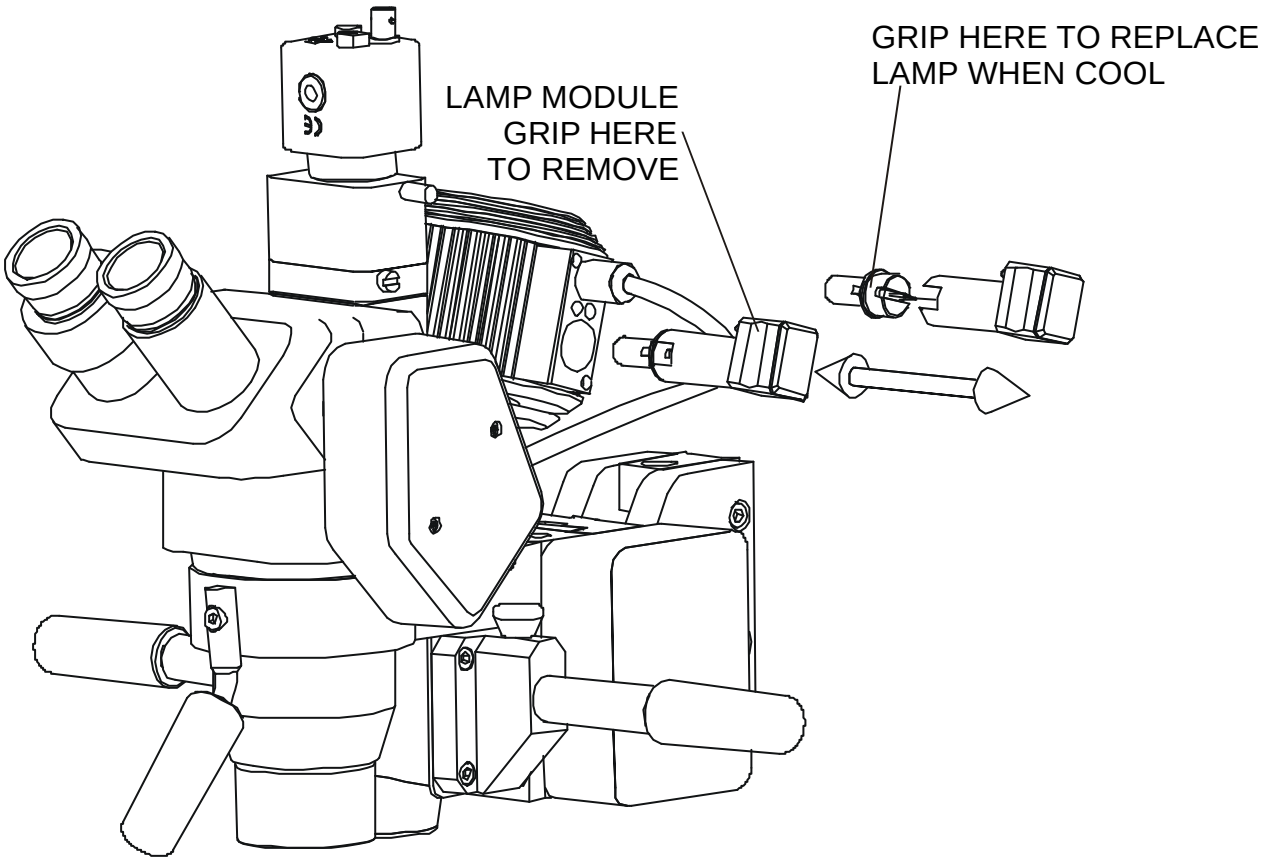
ROUTINE MAINTENANCE

LAMP REPLACEMENT

In the event of lamp failure, the lamp may be replaced quickly and easily by removing the entire lamp module from the side of the lamp housing, and replacing it with the spare which is located behind the lower suspension bracket clamp.

After the replacement has been made, the lamp module that has been replaced should be left to cool before replacing the actual lamp. Allow at least ten minutes for this to occur, and if possible use protective cotton gloves for the procedure.

After the lamp has been replaced, the lamp module should then be replaced as a new quick-change spare, in the holder behind the lower suspension bracket clamp.



CHANGING THE MOULD PROTECTION PELLET

The Scan Optics SO-5800 microscope is fitted with mould protection which lasts for approximately 3 years, but will be dependent on the storage conditions and humidity of the local environment. In extreme tropical climates it may be necessary to change the mould protection as frequently as every year.

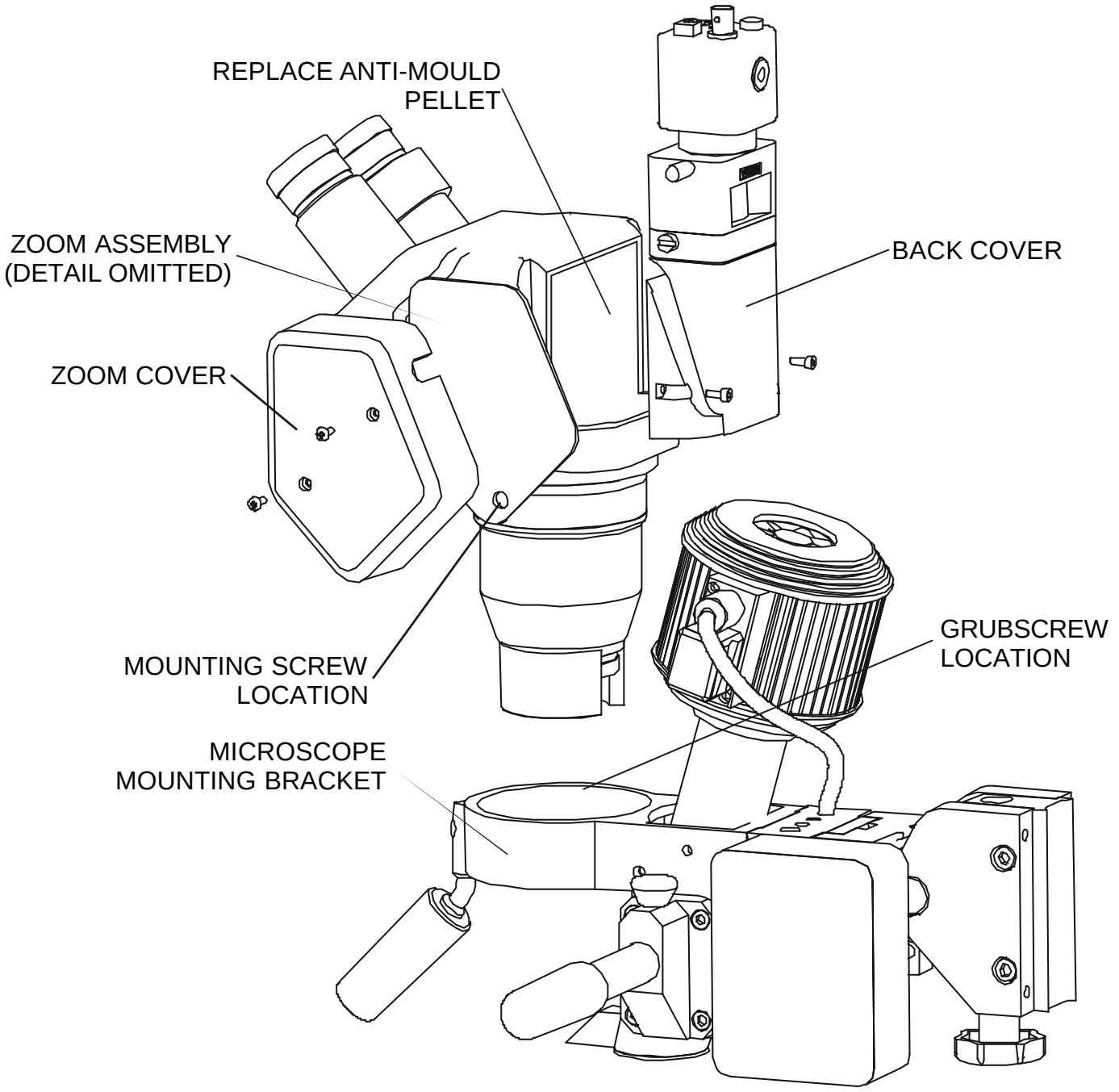
A guide to when the mould protection should be changed is placed on a sticker on the front of the microscope head. However this is indicative only and users should be guided by their own experience and knowledge of local conditions.

As a general precaution, always store the microscope head in a protective bag when not in use, and replace the eyepieces with the protective eyepiece caps.

To replace the mould protection pellet, first disconnect the zoom power cable and remove the zoom drive cover located on the right side of the microscope head. This will expose a large Philips headed screw which fixes the zoom drive assembly to the microscope mounting bracket, by means of a cylindrical spacer located behind the zoom drive plate. Loosen this screw and the grubscrew located directly opposite, on the left side of the microscope head. This will allow the entire microscope head to be lifted clear of its mounting bracket.

Place the microscope head down carefully, and remove the two screws that hold the back cover of the microscope. Remove the back cover carefully, and locate the circular anti-mould pellet that is adhered to the inside of the microscope head. Replace the pellet with a new one, peeling the back off to reveal the new adhesive. Take care not to touch any internal optical components, as these are easily damaged and are difficult to clean correctly if smudged by fingerprints or exposed to dirt of any kind.

Then replace the back cover of the microscope and place the assembly carefully back in its mounting bracket. Fix the mounting screw through the cylindrical spacer and tighten it in to the thread in the mounting bracket. Finally, tighten the remaining grubscrew to fix the microscope head back in place.


REPLACE ANTI-MOULD PELLET
ZOOM ASSEMBLY (DETAIL OMITTED)
BACK COVER
ZOOM COVER
GRUBSCREW LOCATION
MOUNTING SCREW LOCATION
MICROSCOPE MOUNTING BRACKET

FOCUS FRICTION

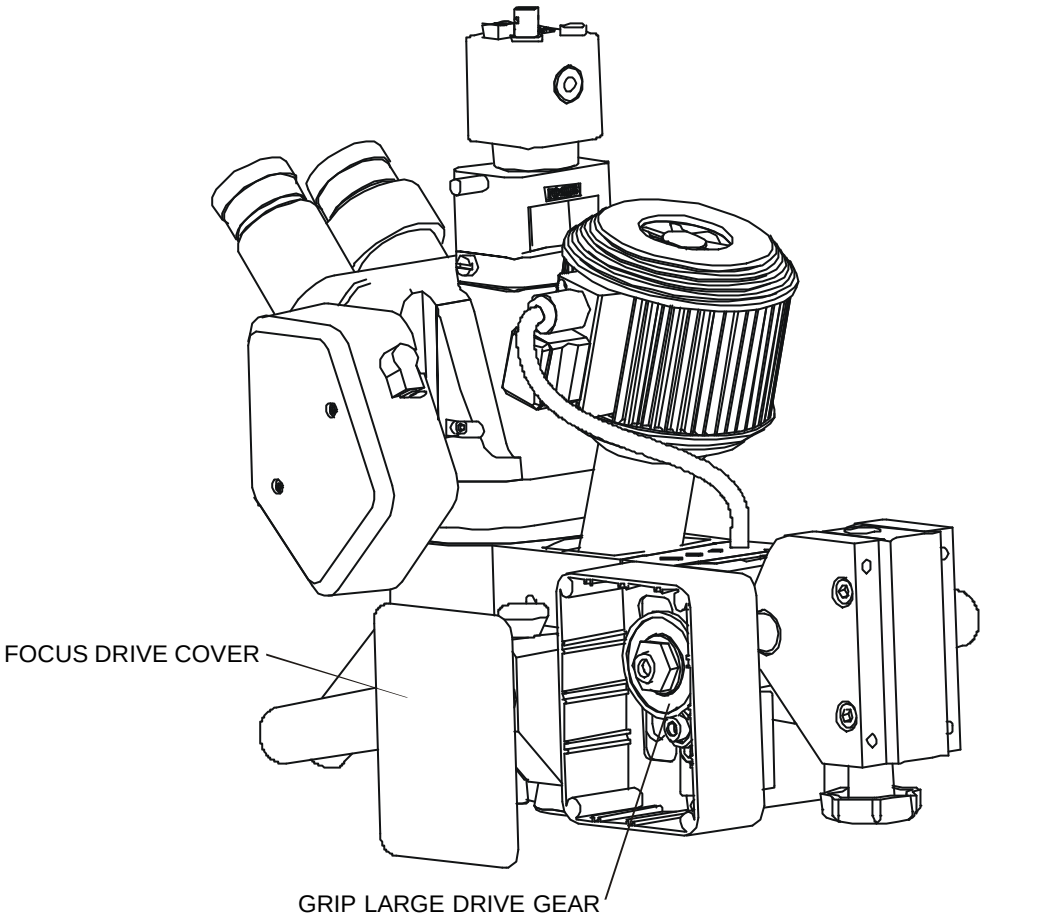
The SO-5800 microscope system relies on a friction device to allow the microscope head to stay in position when it is not being focussed, yet still allow the head to be focussed manually or by the motor drive. Over time or with extended use, the friction may decrease resulting in some slippage of the microscope head focussing system. This is easily remedied by resetting the focus friction.

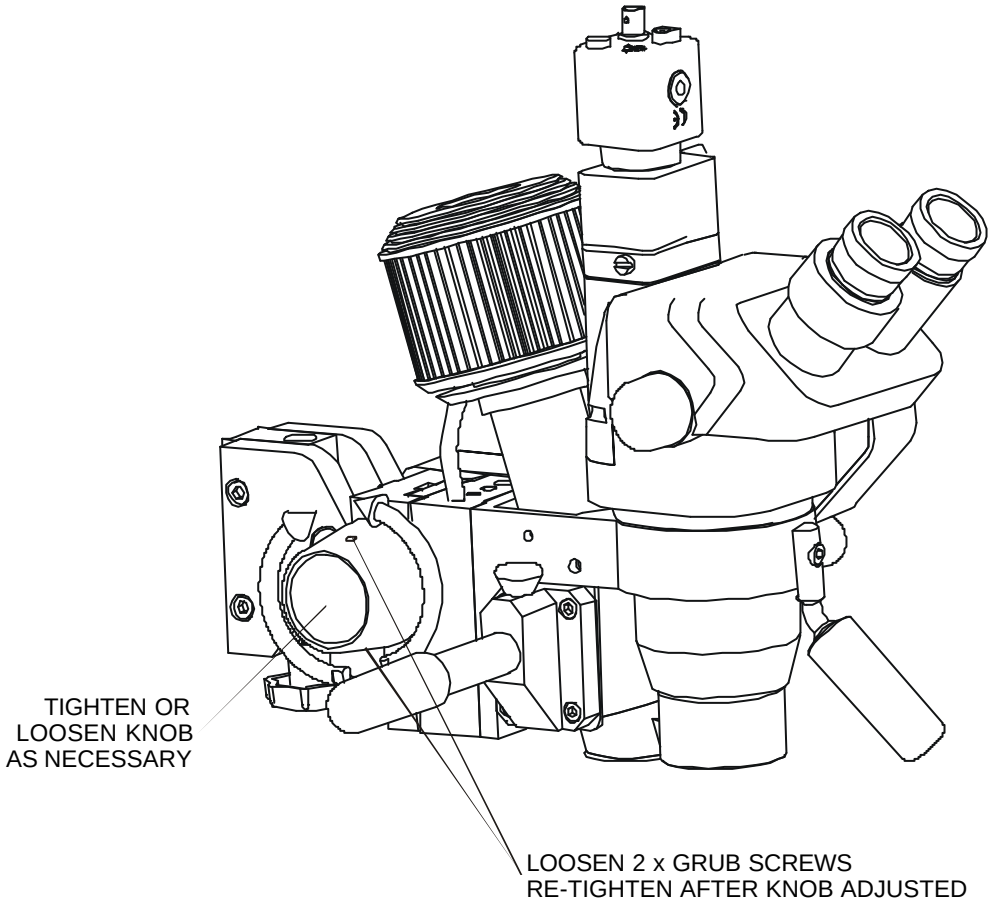
Firstly, focus the microscope all the way down to avoid the possibility of accidental slipping.

Remove the focus drive cover by removing the four screws. Identify the locations of the two holes drilled transversely, 180 degrees apart through the manual focus knob on the other side. Insert a 2mm socket key to loosen the grubscrews in each hole.

While gripping the large white gear steady in the focus drive housing (to ensure the gears do not strip), tighten the knob to increase friction, or loosen it to decrease friction as necessary. When the appropriate setting has been found, tighten the grubscrews again and replace the focus drive cover.

Note that there may be a small level of experimentation required to achieve the best friction setting. If the motor drive becomes too slow, there is probably too much friction although first check that the motor speed adjustment on the main panel is not set excessively low. If the focus system tends to slip, especially at the top of the range, the amount of friction needs to be increased. In most cases a slight increase in friction works best when the focus system is showing signs of slipping.


FOCUS DRIVE COVER
GRIP LARGE DRIVE GEAR


TIGHTEN OR
LOOSEN KNOB
AS NECESSARY
LOOSEN 2 x GRUB SCREWS
RE-TIGHTEN AFTER KNOB ADJUSTED